

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 45

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte NALIN KUMAR and CHENGGANG XIE

Appeal No. 2002-2296
Application No. 08/474,277

ON BRIEF

Before THOMAS, KRASS, and BARRETT, Administrative Patent Judges.

KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 2, 4-6, 11-15, 18 and 20-24.

The invention is directed to a method of making field emitters for applications

Independent claim 2 is reproduced as follows:

2. A method of making a field emission cathode, comprising the steps of depositing a layer of conductive material over a first substrate:

depositing an electrically resistive pillar over said layer of conductive material, said electrically resistive pillar having a substantially flat surface spaced from and substantially parallel to said first substrate, and

depositing a layer of cathode material over said surface of said electrically resistive pillar, said layer of cathode material having a substantially flat exposed surface spaced from and substantially parallel to said first substrate, wherein said layer of cathode material has a surface area greater than 6400π square nanometers in area.

The examiner relies on the following references:

Spindt et al. (Spindt)	3,789,471	Feb. 05, 1974
Christensen	4,663,559	May 05, 1987
Kane et al. (Kane)	5,138,237	Aug. 11, 1992
		(filed Aug. 20, 1991)

Wang et al. (Wang) "Cold Field Emission from CVD Diamond Fields Films Observed in Emission Electron Microscopy," Electronic Letters, Vol. 27, No. 42 (1991) pp. 1459-1461.

Claims 2, 4-6, 11-15, 18 and 20-24 stand rejected under 35 U.S.C. § 103. As evidence of obviousness, the examiner offers Christensen in view of Kane, Wang and Spindt.

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Reference is made to the briefs and answer for the respective positions of appellants and the examiner.

OPINION

At the outset, we note that we rendered an earlier decision in this case (Appeal No. 1998-2745) on June 26, 2001, wherein we reversed the examiner's decision with regard to claims 2, 4-6, 11-15, 18 and 20-24 over Yamada [vis. Patent No. 3,855,499] in view of Christensen and Spindt under 35 U.S.C. § 103 but we entered a new ground of rejection against the claims under 35 U.S.C. § 103 and 35 U.S.C. § 112, first paragraph.

In the earlier decision, with regard to 35 U.S.C. § 112, first paragraph, we noted that there was no support in the originally filed application for the claimed cathode material surface area being "greater than 20,106.2 square nanometers in area."

The instant claims now call for the surface area being "greater than 6400π square nanometers in area." The examiner maintains the rejection under 35 U.S.C. § 112, first paragraph, contending that there is no support for this new limitation.

Appellants contend that at page 15, line 23, of the instant substitute specification, it is recited that the flat cathode field emission surface may have a cross-

contend appellants, they were clearly in possession of the invention as recited in claim 2 as evidence by the written description.

The disclosure within the substitute specification notwithstanding, the written description requirement of 35 U.S.C. § 112, refers to the specification at the time of filing the application. Unless appellants can point to support for the now claimed limitation within the four corners of the disclosure, *as originally filed*, they have not shown that they were in possession of the subject matter, as now claimed, at the time of filing.

Accordingly, we will sustain the rejection of claims 2, 4-6, 11-15, 18 and 20-24 under 35 U.S.C. § 112, first paragraph, as relying on an inadequate written description.

With regard to the rejection of the claims under 35 U.S.C. § 103, the instant claims have been amended from their form at the time of our earlier decision in order to indicate that the layer of cathode material has a surface area greater than 6400π square nanometers in area so as to be outside the scope of the teachings of Christensen, which appears to limit the tip of the cathode to a radius of 80 nanometers or less [column 11, line 42]. A tip of 80 nanometers in radius would translate to a tip area of πr^2 , or 6400π square nanometers.

While we appreciate appellants' efforts in attempting to overcome the Christensen teachings by limiting the instant claims to a layer of cathode material having a surface area "greater than 6400π square nanometers in area," we note, as did the examiner, that Christensen's tip of 80 nanometers in radius is only a preferred embodiment and Christensen clearly indicates, at column 6, line 68 through column 7, line 1, that, in at least one instance, the tip radius may be "between 50 and 90 nanometers." Clearly, at 90 nanometers in radius, the area of the tip would be 8100π square nanometers, meeting the claim limitation of "greater than 6400π square nanometers in area."

Appellants argue that their invention is a "pioneering invention" and should be afforded a greater degree of breadth. This argument is misplaced. While a pioneering invention may be entitled to a broader range of equivalents under the doctrine of equivalents, appellants have not shown how this is applicable to the instant case where Christensen suggests a flat cathode emission surface, Spindt teaches that in a field emission cathode device, utilization of a resistive material for the pedestal of a needle-like structure is of special importance, and Kane teaches that electron emitters are not limited to tips or edges of small radius of curvature. (The examiner also relies on Wang

led artisans to reason that Christensen's cathode emission surface need not be limited to a "micro-tip structure." Accordingly, we do not find persuasive appellants' arguments that the instant claimed invention somehow distinguishes over the prior art because it is a pioneering invention not related to micro-tipped structures or that Spindt somehow "teaches away" because it is not directed to flat cathodes.

Further, appellants argue that Kane is somehow not applicable, in combination with the other references, because Kane "teaches a diamond semiconductor material used for the electron emitter having an electron affinity of less than 1.0 electron volts corresponding to one crystallographic plane and an electron affinity of less than 0.0 electron volts corresponding to yet another crystallographic plane" [principal brief-page 4]. While this train of argument results in appellants concluding that Kane "would not be understood to necessarily teach a flat emission electrode" [principal brief-page 5], we are not convinced. Column 5, lines 57-63, of Kane indicates that "electron emitters are not limited to geometric formations, such as tips/edges of small radius of curvature..." Thus, the artisan would have understood that the electron emitters of Kane were not limited to micro-tip emitters (i.e., those with a small radius of curvature), but may also be applicable to flat emission cathodes, or emitters.

While appellants argue that the resulting topography in Kane would not be a flat surface [principal brief-page 5], it would appear that appellants' topography would also not be completely flat due to normal, microscopic hills and valleys. Accordingly, we do not find this argument persuasive of non-obviousness.

Appellants argue that Christensen's structure is a micro-tip structure regardless of the flat surface shown in its drawings. Appellants further urge that Wang does not show a flat cathode, but rather a micro-tip structure. However, even if that were so, as we stated in our earlier decision, to whatever extent Christensen (or Wang) is considered to disclose a micro-tip structure for the cathode emission surface, Kane's teaching of the emitter not being limited to tips or edges of small radius of curvature would have clearly suggested to artisans that Christensen's (or Wang's) cathode emission surface need not be limited to a micro-tip structure.

Since we do not find appellants' various arguments regarding unobviousness of the instant claimed subject matter convincing in view of the examiner's prima facie case of obviousness, we will sustain the rejection of claims 2, 4-6, 11-15, 18 and 20-24 under 35 U.S.C. § 103.

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The examiner's decision rejecting the claims under 35 U.S.C. § 112, first paragraph, and under 35 U.S.C. § 103, is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

JAMES D. THOMAS
Administrative Patent Judge

ERROL A. KRASS
Administrative Patent Judge

LEE E. BARRETT
Administrative Patent Judge

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